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Before the
Federal Communications Commission
Washington, D.C. 20554

In Re

The Impact of Advanced
Television Technologies on
Local Television Broadcasting

RM-5811

COMMENTS OF THE SATELLITE BROADCASTING
AND COMMUNICATIONS ASSOCIATION IN OPPOSITION
TO PETITION FOR NOTICE OF INQUIRY

June 10, 1987

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I. INTRODUCTION

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The Satellite Broadcasting and Communications Association ("SBCA") is a trade association made up of all segments of the home satellite industry including C-band and both low and high powered Ku-band DBS. Its members include satellite manufacturers, satellite system operators, earth segment equipment manufacturers, retailers and distributors of home satellite receiving equipment, and satellite television programmers. SBCA submits these Comments in opposition to certain proposals contained in the Petition for Notice of Inquiry (the "Petition"), submitted on February 13, 1987, by the Association of Maximum Service Telecasters ("AMST"), the National Association of Broadcasters ("NAB"), and various broadcast licensees (the "Petitioners"). These Comments further reply, in part, to the Comments of CBS, Inc. ("CBS Comments") filed in support of the Petition on February 24, 1987.

The Petition raises questions pertaining to the issues arising from the introduction of high definition television ("HDTV") and other advanced television technologies and the impact of such technologies on local broadcasting. The Petitioners and CBS, Inc. urge the Commission to initiate an inquiry into such issues and seek, inter alia, an examination of the possibilities for the reallocation to the terrestrial broadcasting service of a part of the 12.2-12.7 GHz band now allocated to the direct broadcast satellite ("DBS") service.

The Petition requests that the Commission issue a Notice of Inquiry to examine "issues arising from the introduction of HDTV and other advanced television technologies" and asserts that the existing 6 MHz bandwidth of channels in the UHF TV band is insufficient for the delivery of HDTV service (Petition, pp. 15, 20-21). The Petition does not discuss whether the number of 6 MHz channels provided in the existing UHF band would be adequate to permit the transmission of HDTV signals if used in pairs for this purpose.

Instead, and with apparently little consideration of the technical and economic implications, the Petition and CBS Comments urge the Commission to inquire into the possible use of spectrum other than the UHF band for terrestrial HDTV broadcast. Specifically, the Petitioners have requested that the Commission consider a reallocation of a part of the 12.2-12.7 GHz DBS service band. These Comments are confined to the issue of reallocation of such DBS band and shall address the technical infeasibility and detrimental economic consequences involved with the application of that band for terrestrial broadcasting.

In its Report and Order, Direct Broadcast Satellite Service, 90 FCC 2d, 676 (1982), the Commission allocated the entire 500 MHz bandwidth in the band 12.2-12.7 GHz for DBS service, declining any allocation thereof to terrestrial broadcasting. Subsequent to that Report and Order, the Regional Administrative Radio Conference of 1983 ("RARC-83")

developed a plan of frequency and orbital position assignments in this band for all countries in the Western Hemisphere. The RARC-83 Plan was incorporated in the Radio Regulations at WARC-ORB-85 and therefore has the status of an international treaty; accordingly, any examination of the possible reallocation of that band requires consideration of the international ramifications.

SBCA's membership (which includes permittees having full authority to construct DBS systems utilizing all portions of the 12 GHz band as provided in the RARC-83 Plan) strongly contests the initiation of any Inquiry into the possible reallocation of a portion of the 12 GHz DBS band for terrestrial usage. SBCA contends that any proposal for such usage is ill-conceived by reason not only of the technical infeasibility and economic impracticality of using this band for terrestrial broadcasting, but also because of the detrimental effect that such reallocation would have on the future feasibility of DBS service. Indeed, such a reallocation would render the band unsuitable for satellite transmission of HDTV, the very type of television transmission the Petitioners claim to support.

II. THE 12 GHz BAND IS TECHNICALLY AND ECONOMICALLY INFEASIBLE FOR USE IN TERRESTRIAL BROADCAST HDTV SERVICE.

The Petitioners, in the Petition (p. 30), acknowledge and admit that:

"...many broadcasters feel that it will never be technically feasible to use the 12 GHz band

for terrestrial broadcasting. Signals in this band have an extremely limited range. For example, even assuming a signal radius of twenty miles, it could require as many as ten transmitters to cover the service area now covered by a single VHF or UHF transmitter and the problems of frequency coordination and mutual interference might be too expensive or even impossible to overcome."

The Petitioners go on to recognize that such service would have vulnerability to blockage and rain attenuation and that "cost considerations might make this option wholly unfeasible" (Id. at p. 31.). SBCA fully concurs with this conclusion and submits that the opening of an inquiry with respect to reallocation of the 12 GHz band would be imprudent and ill advised.

There are basically six coverage problems associated with the terrestrial usage of the 12 GHz band for HDTV transmission: rain attenuation, multipath propagation, blockage or shadowing within the coverage area, the small size of the coverage area, the characteristics of the transmitting antenna, and the characteristics of the receiving antenna.

While rain attenuation can be virtually ignored in VHF and UHF, such attenuation can be very significant at 12 GHz, and its effects must be considered in determining the cost and feasibility of broadcasting in this band. In DBS delivery rain has very little impact because the satellite signal must pass through usually no more than one mile of rain. Contrast that with VHF or UHF delivery which might require passage of the signal through twenty to thirty miles of rain. In order to

overcome rain attenuation problems, broadcast stations would require significantly more transmitter power and better locations than are acknowledged by Petitioners. It is the belief of the Technical Committee of SBCA that each broadcast station would require as many as twenty-five separate transmitters in each service area to provide sufficient power to overcome rain attenuation problems in 12 GHz band delivery, as well as the other problems discussed below.

A second problem associated with the use of the 12 GHz band for terrestrial broadcasting is the multipath propagation characteristics of such usage. Such multipath propagation results in the "ghosting" of television images and while the problem exists within the UHF band, it is far more acute at 12 GHz. Multipath propagation problems were confirmed in the recent demonstration (January, 1987) of HDTV transmission on two UHF TV channels by AMST and NAB.

Again in contrast to VHF and UHF, blockage (or shadowing) is a significant problem for terrestrial usage at 12 GHz. However, blockage is not a major consideration in DBS applications. In a terrestrial broadcasting system it is virtually impossible to design the system in a manner which allows avoidance of trees, hills, buildings and other obstacles. Such a design would be crucial as terrestrial broadcast at 12 GHz requires true line-of-sight; a tree or building blocking line of sight could be fatal. This blockage factor must be taken into account on a statistical basis. That

is, the e.i.r.p. must be increased significantly to provide a signal of the specified level at the specified percentage of potential receiver locations throughout the service area. As the power loss through blockage is much higher at 12 GHz than at VHF or UHF, the necessary power increase to overcome such blockage at 12 GHz is far greater and can easily reach levels beyond any transmitters now available or under development.

Quite apart from rain attenuation, blockage and multipath problems, the rapid reduction of field strength with distance from the transmitter associated with terrestrial broadcasting at 12 GHz leads to greatly limited service areas for each transmitter used. As noted above, the SBCA Technical Committee has advised that to provide coverage in each service area without interstitial pockets of poor signals, at least twenty-five 12 GHz supplemental transmitting stations would be needed to meet the coverage provided by one local broadcast station.

The transmitting antenna presents another problem for terrestrial broadcasting at 12 GHz. Transmission lines and waveguides at 12 GHz introduce power loss as much as 4.5 dB per 100 feet. For a transmitter located at the base of the high towers needed for coverage in flat portions of the country (e.g., 1000 feet), the loss would be tens of dBs. Additionally, heat dissipation in waveguides would limit the RF power to only 3000 watts, far less than would be needed for transmission. The alternative of transmitters located at the top of towers would

present structural, maintenance, regulatory, and safety problems which would be totally unacceptable.

The final consideration in examining coverage problems related to terrestrial broadcasting at 12 GHz is the characteristics of the receiving antenna required for such service. VHF dipole antennas and UHF loop antennas are simple but they extract less power from a radio wave as frequency increases. The power reduction from VHF to 12 GHz may be as much as 60,000 times (i.e., 48 db). Such reduction must be made up for by an increase in transmitter power, use of a more expensive high-gain antenna, or both.

In fact, it is highly likely that reception of 12 GHz broadcast signals would require the use of highly directive parabolic dish antennas which would require expensive installation at the top of masts to obtain true line-of-sight reception (i.e., no vegetation blockage, etc.), rigid mounting and accurate positioning throughout their lifetime. (It should be noted that installation of dish antennas would encounter another problem perhaps not considered by Petitioners: local restrictive zoning ordinances prohibiting roof-top or pole-mounted antennas. Such problems are continually faced by the TVRO industry.) While similar, but much less severe, installation and positioning problems exist with dish antennas for DBS, it must be kept in mind that the decision to receive DBS is one which the consumer elects to make to receive subscription services; these problems should not be imposed

upon the general public for reception of off-air broadcast signals.

The foregoing problems of rain attenuation, multipath propagation, limited coverage, blockage, and antenna characteristics can be overcome, if at all, only through expensive, burdensome, and undesirable countermeasures. Such measures would include installation of multiple transmitters (perhaps as many as twenty-five for each station in each service area), very high power requirements for transmitters, and installation of parabolic dish antennas on tall masts in most situations. Such requirements make it clear that terrestrial broadcast at 12 GHz is not feasible now or in the future.

III. INTERFERENCE CONSIDERATIONS

Any reallocation of the 12 GHz band must also take into consideration the effect of terrestrial broadcast at 12 GHz on broadcast satellite service (BSS) receivers in Canada and Mexico. As discussed above, the RARC-83 Plan developed a channel assignment and orbital plan in the 12 GHz band for the BSS in ITU Region 2, the Western Hemisphere. Any terrestrial transmitters within the United States broadcasting at 12 GHz would have to be as much as 180 to 200 miles from Canadian and Mexican borders to prevent mutual interference problems. Accordingly, the area serviceable by 12 GHz broadcast will be greatly limited.

IV. THE REALLOCATION OF ANY PORTION OF THE 12 GHZ
BAND WOULD DETRIMENTALLY IMPACT THE DEVELOPMENT
OF DBS SERVICE

a. Public interests in and benefits of
DBS service

The Commission in Direct Broadcast Satellites, 90 FCC 2d 676, 678-682, specifically recognized the public interest in the utilization of the 12 GHz band for DBS and the benefits of such service. In that Report and Order the Commission states:

"We continue to believe that the benefits of authorizing DBS service will outweigh the costs, and that DBS service could constitute a valuable use of the 12 GHz band. Therefore, we believe that authorization of DBS systems in the 12.2-12.7 GHz band would serve the public interest." (at p. 679)

The Commission further reported:

"We have examined the record and have concluded that DBS has the potential to provide extremely valuable services to the American people. The possible benefits of the service include the provision of improved service to remote areas, additional channels of service throughout the country, programming offering more variety and that is better suited to viewers' tastes, technically innovative services, and expanded non-entertainment services." (at p. 680)

SBCA submits that those conclusions remain as viable today as they were at the time of the Commission's Order. Indeed, the Commission has reaffirmed this position as recently as 1986 (FCC 86-530, In re Petition of United States Satellite Broadcasting Co., Inc.). The television viewing public is more sophisticated, and a large segment of the American public desires and is willing to pay for equipment that will allow

them to enjoy the expanded services recognized by the Commission as being available through DBS service. A survey conducted by the Roper Organization in December, 1986, indicated that sixteen percent of the adult population would like to own a home TVRO system. It is logical to assume that with the advent of high powered DBS service and its corresponding smaller dishes, that number would be significantly higher.

Such service will not only bring entertainment and information to the rural population, but will offer a service which would be attractive to the urban viewer as well. And, again, as dish sizes are radically reduced, aesthetic considerations associated with home dishes are largely eliminated and the attractiveness of home dish ownership is vastly increased.

As discussed below, various parties are working toward the launch of DBS systems and it is anticipated that at least one such system will be operational early in the next decade. It would be clearly contrary to the public's interest to disrupt or abridge this nascent technology at a time when the anticipated benefits of DBS are about to become a reality.

b. Effect of the reallocation of the
12 GHz spectrum.

There are presently five permittees holding licenses for construction of DBS systems: Hughes Communications Galaxy,

Inc., Satellite Television Corp., USSB, Dominion Video Satellite, Inc., and Advanced Communications Corp. At least one of those parties, Hughes Communications Galaxy, Inc., is in the actual construction stage of a DBS system and is currently planning a launch of that system and the STC satellites are essentially ready for launch. Once those satellites and others are in service, DBS will have the capability of delivering a vast number of programming services to the public, fulfilling the benefits foreseen by the Commission.

As previously noted, the band 12.2-12.7 GHz has been allocated domestically to the DBS service. Current users of this band in the operational fixed service must vacate the band by September 1988 or assume a secondary user status at that time (DBS order at 702). DBS use of the band must conform to the Plan of orbital positions and frequency assignments adopted at the 1983 Regional Planning Conference. In this Plan, the band 12.2-12.7 GHz was divided into 32 channels, each 24 MHz wide. Adjacent channels overlap each other but are assigned opposite polarization.

The US received all 32 channels at each of eight orbital positions although four of these positions are too far west for nationwide coverage and one is too far east to avoid eclipse problems. At the three orbital positions that offer national coverage and eclipse protection, the FCC has assigned all 32 channels at 101 degrees and 119 degrees W.L. and 30 channels at 110 degrees W.L. among a total of five construction permit

holders. Eight channels have also been assigned to one of these permittees at 148 degrees W.L. and applications have been accepted from two additional corporations who have requested 16 channels each at 110 degrees W.L. where only 2 are available and at 148 degrees W.L. where 24 are as yet unassigned.

It is clear that all 32 channels at the four key orbital positions have been assigned or requested and, at two of these positions, the total number of assigned and requested channels greatly exceeds the total number provided to the US in the RARC-83 Plan.

If the FCC were to reallocate half of the DBS band to terrestrial broadcasting, the effect could be more complicated than merely eliminating half of the applicants by taking away all the channels assigned to them. In most cases it would mean taking away half the channels assigned to each applicant. The reason is that a given DBS satellite is normally assigned channels with only one polarization, which means either the odd-numbered or even-numbered channels because of the interleaving of oppositely polarized channels. Thus a typical 16-channel assignment embraces nearly the entire 500 MHz of bandwidth. To reallocate half the band would be to reduce the maximum co-polarized assignment per satellite to 8 channels.

The majority of the DBS permittees consider that such a limit would have an unacceptable impact on their business

plans. In addition, some permittees would be forced to scrap large investments in satellites planned to deliver the number of channels authorized by the FCC and most importantly, the vast choice of channels offered by DBS would be lost, to the detriment of the public.

CONCLUSION

The Satellite Broadcasting and Communications Association (SBCA) opposes the Petition insofar as the petition seeks reallocation of a part of the 12.2 to 12.7 GHz band previously allocated to the direct broadcast satellite (DBS) service.

It is the belief of SBCA that (a) the use of the 12 GHz DBS spectrum for terrestrial broadcasting is technically and economically infeasible, (b) that any reallocation of this band will severely impact the development of DBS service to the public detriment, and (c) because the 12 GHz band is the subject of an international plan for DBS pursuant to the Regional Administrative Radio Conference of 1983 ("RARC-83"), any consideration of the possibility of reallocation must involve a review of the international implications.

In light of these circumstances, the Commission should not consider any reassignment or reallocation of the 12.2-12.7 GHz band during the course of these proceedings or in any subsequent related inquiries.

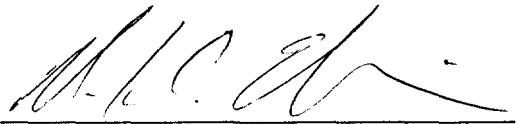
Respectfully submitted,

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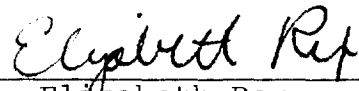
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